

PHASE I BOOK EXPLOITATION

SOV/6319

Berezin, Il'ya Vasil'yevich, Yevgeniy Timofeyevich Denisov, and
Nikolay Markovich Emanuel'

Okisleniye tsiklogeksana (Oxidation of Cyclohexane) [Moscow]
Izd-vo Mosk. univ., 1962. 301 p. Errata slip inserted. 3500
copies printed.

Ed.: N. A. Korobtsova; Tech. Ed.: T. A. Kozlova.

PURPOSE: This book is intended for chemists and chemical engineers
engaged in the industrial oxidation of cyclohexane.

COVERAGE: The book discusses current theory and technology of
cyclohexane oxidation. Although the text is based primarily on
non-Soviet materials, the discussion of kinetics is taken entirely
from N. N. Semenov's theory of degenerate-branched chain reactions.
The oxidation of cyclohexane is presented in the broadest range,
e.g., from elementary reactions to the technological process.
References are given at the end of each chapter.

Card 1/4

DENISOV, Ye.T.; KHARITONOV, V.V.

Kinetics of hydrogen peroxide consumption in the oxidation of
cyclohexanol. Neftekhimika 2 no.5:760-765 S-O '62. (MIRA 16:1)

1. Institut khimicheskoy fiziki AN SSSR.
(Cyclohexanol) (Oxidation) (Hydrogen peroxide)

DENISOV, Ye.T. (Moscow)

Models of degenerate chain-branching reactions with several
intermediate products. Zhur. fiz. khim. 36 no.11:2352-
2361 N'62. (MIRA 17:5)

1. Institut khimicheskoy fiziki AN SSSR.

40570

5,2400.
11.1510

S/020/62/146/002/012/013
B101/B144

AUTHOR: Denisov, Ye. T.

TITLE: Formation of free radicals on interaction of hydroperoxide and cyclohexanone

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 146, no. 2, 1962, 394-397

TEXT: The author and V. V. Kharitonov found that cyclohexanone and H_2O_2 obtained by the oxidation of cyclohexanol, combine reversibly to form a hydroxy cyclohexyl hydroperoxide, disintegrating into free radicals more rapidly than H_2O_2 . Tert-butyl hydroperoxide and cyclohexanone in chlorobenzene were examined to find out whether such a chain branching also occurs when hydroperoxides react with ketones. The consumption of α -naphthyl-amine (inhibitor) was measured to determine the formation rate of free radicals. Results: Hydroperoxide C_6H_{10} $\begin{matrix} \nearrow OOR \\ \searrow OH \end{matrix}$ which decomposes into free radicals more rapidly than tert-butyl hydroperoxide, is formed even

Card 1/3

Formation of free radicals...

S/020/62/146/002/012/013
B101/B144

in the presence of inhibitors. At an inhibitor concentration, $[InH]$, of $1 \cdot 10^{-4}$ to $20 \cdot 10^{-4}$ moles/l, the inhibitor consumption does not depend on the concentration. The formation rate of free radicals is a linear function of the hydroperoxide concentration $[ROOH]$. The following data were obtained at $120^{\circ}C$:

Ketone % by volume	$[InH] \cdot 10^4$ moles/l	$[ROOH]$	$W_1 \cdot 10^8$ moles/l·sec	$K_1 \cdot 10^6 \text{ sec}^{-1}$
0	2.5	0.050	5	1.00
5	2.63	0.050	13.7	2.74
20	3.26	0.042	20.8	4.95
70	4.41	0.043	26.0	6.05
100	11.5	0.047	30.5	6.50
100	21.7	0.108	67.0	6.20

It is inferred that: $ROQH \xrightarrow{k_1} RO^{\cdot} + \cdot OH$; $ROOH + \text{ketone} \xrightleftharpoons[k_2]{k} X$; $X \xrightarrow{k_2} \text{free radicals}$; $k_1 = (k_1 + k_2 K [\text{ketone}]) / (1 + K [\text{ketone}])$. Ketone peroxide is formed with the liberation of approximately 11 kcal/mole; its activation Card 2/3

Formation of free radicals...

S/020/62/146/002/012/013
B101/B144

energy of decomposition is 26 kcal/mole. The reaction constants were:
 $k_1 = 1.8 \cdot 10^{12} \exp(-33000/RT) \text{sec}^{-1}$; $k_2 = 1.8 \cdot 10^9 \exp(-26000/RT) \text{sec}^{-1}$;
 $K = 6.9 \cdot 10^{-7} \exp(11000/RT) \text{ l/mole}$. The simultaneous addition of ketone
and hydroperoxide initiates the oxidation more intensively than their
separate addition. There are 4 figures and 2 tables.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute
of Chemical Physics of the Academy of Sciences USSR)

PRESENTED: April 4, 1962, by V. N. Kondrat'yev, Academician

SUBMITTED: March 30, 1962

Card 3/3

ACCESSION NR: AT4010620

S/3051/63/000/000/0420/0427

AUTHOR: Emanuel', N. M.; Denisov, Ye. T.

TITLE: Stimulation and inhibition of the reaction of liquid-phase oxidation in the light of the chain theory

SOURCE: Kataliticheskiye reaktsii v zhidkoy faze. Trudy* Vsesoyuznoy konferentsii. Alma-Ata, 1963, 420-427

TOPIC TAGS: oxidation stimulation, oxidation inhibition, liquid phase oxidation, oxidation, chain theory, branched chain, free radical, chain reaction

ABSTRACT: The article discusses the Semenov theory (N. N. Semenov, Tsepnyye reaktsii, L. Goskhimizdat, 1934) of chain reactions with a degenerated, branched chain. The latest concept of these chain reactions includes the following main points: 1) The formation of free radicals in an oxidation reaction is primarily due to the stimulation caused by hydroperoxides, although acids and ketones such as cyclohexanone may also play a role. 2) The formation of free radicals may also involve nonperoxide substances, as in the oxidation of methylethylketone which yields diacetyl; diacetyl rapidly decomposes to free radicals. 3) The low, initial rate of hydrocarbon oxidation may be increased by adding initiators such as peroxides, azo-compounds, and salts of metals with variable valences. Salts of metals
Card 1/2

ACCESSION NR: AT4010620

however, may also act as inhibitors, as exemplified by KMnO_4 in the oxidation of n-decane. This inhibition suggests the existence of a Mn^{2+} critical concentration, which reverses the stimulation. 4) The oxidation of paraffin to fatty acids can be initiated by γ -radiation from a cobalt source. 5) Heterogeneous catalysts such as metallic oxides act as stimuli in reactions of liquid-phase oxidation, as exemplified by a MnO_2 catalyst in the oxidation of isobutylene. The article continues with a discussion of the critical factors in an inhibited reaction. The inhibitor concentration that effects a break in the chain and the use of inhibitors in studies of complex chain-nonchain reactions yielding free radicals are also mentioned. Orig. art. has: 40 chemical formulas and 4 figures.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics AN SSSR)

SUBMITTED: 00

DATE ACQ: 25Jan64

ENCL: 00

SUB CODE: GC, GP

NO REF SOV: 015

OTHER: 001

Card 2/2

L 12733-61

EPF(c)/EWT(m)/BDS Pr-4 RM/WW/JFH

ACCESSION NR: AP3002282

S/0062/63/000/006/0980/0991

AUTHOR: Denisov, Ye. T.

60

TITLE: The mathematical models of complex chain reactions of oxidation

SOURCE: AN SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 6, 1963, 980-991

TOPIC TAGS: complex chain degenerate-branched reactions

ABSTRACT: The author studies theoretical models of complex chain degenerate-branched reactions followed by transformations of four intermediate products into each other, occurring with the participation of various sorts of free radicals. The influence of separate factors (activation of radicals, their constant of recombination) on the rate and accumulation of intermediate products in the complex chain process is also established. "I express my deep gratitude to the mathematician V. T. Gontkovskoy for the programming and solution of systems of differential equations." Orig. art. has: 11 tables and 16 figures.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences, SSSR)

Card 1/2/

DENISOV, Ye.T.; DENISOVA, L.N.

Mechanism underlying degenerated chain branching in cyclohexanone during its oxidation. Izv. AN SSSR Ser.khim. no.10:1731-1737 0
'63. (MIRA 17:3)

1. Institut khimicheskoy fiziki AN SSSR.

DENISOV, Ye.T.

Decomposition of initiators into radicals studied by the method
of inhibitors. Izv. AN SSSR. Ser. khim. no.11:2037-2039 N '63.
(MIRA 17:1)

1. Institut khimicheskoy fiziki AN SSSR.

DENISOV, Ye.T.; KHARITONOV, V.V.

Special features of the inhibiting action of -naphthyl-
amine in cyclohexanol oxidation. Izv. AN SSSR, Ser. khim.
no.12:2222-2225 D '63. (MIRA 17:1)

1. Institut khimicheskoy fiziki AN SSSR.

L 13513-63

EWB(j)/EWT(m)/BDS Pc-4 RM/WW

ACCESSION NR: AP3002776

S/0204/63/003/003/0360/0366

AUTHOR: Denisov, Yo. T.; Solyanikov, V. M.

TITLE: The study of the kinetics of oxidation of isopropyl alcohol

SOURCE: Neftekhimiya, v. 3, no. 3, 1963, 360-366

TOPIC TAGS: alcohol, alpha-naphthol, hydrogen peroxide, oxidation kinetic isopropyl alcohol oxidation

ABSTRACT: This work is dedicated to the study of the chain mechanism of the oxidation of isopropyl alcohol. The quantitative characteristics of isopropyl alcohol oxidation in the form of elemental constants and activation energy have been obtained. The isopropyl alcohol was oxidized in a glass reactor with oxygen from the air at a temperature of 86 to 138C and a pressure of 10 to 15 atm. Peroxide of tert.-butyl was added to initiate the reaction. The rate of oxidation was measured by the speed of H sub 2, O sub 2 accumulation. The experiments were also conducted using other types of initiators. The rate of decomposition of the initiator into radicals was measured by the inhibitor method with alpha-naphthol. During the reaction, the inhibitor was consumed at a constant rate which indicates the constant formation of free radicals in

Card. 1/2

L 13513-63

ACCESSION NR: AP3002776

the course of the reaction as a result of the initiator. From the kinetic curves, the consumption of inhibitor of alpha-naphthol and the accumulation of hydrogen peroxide during the oxidation of isopropyl alcohol at a constant of rate of reaction of the peroxide radical with the inhibitor and isopropyl alcohol has been found. The activation energy of the first reaction is 4400 cal/mole. Orig. art. has: 4 tables, and 4 figures.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics, Academy of Sciences SSSR)

SUBMITTED: 29Sep62

DATE ACQ: 23Jul63

ENCL: 00

SUB CODE: 00

NO REF SOV: 004

OTHER: 003

Card 2/2

L 15480-63

EWP(j)/EPF(c)/EWT(m)/BDS Pc-4/Pr-4 RM/WW

ACCESSION NR: AP3005452

S/0204/63/003/004/0558/0564

AUTHORS: Denisov, Ye. T.; Kharitonov, V. V.

TITLE: Kinetic equilibrium of the concentration of the intermediate products during oxidation reaction of cyclohexanol

SOURCE: Neftekhimiya, v. 3, no. 4, 1963, 558-564

TOPIC TAGS: cyclohexanol oxidation, cyclohexanol, hydrogen peroxide, cyclohexanone, kinetic equilibrium

ABSTRACT: Authors attempted to find the concentration limits of hydrogen peroxide and cyclohexanone in the oxidation of cyclohexanol. Authors discovered that maximum concentrations of H_2O_2 and cyclohexanone depend upon the initial addition of these products to the reaction. Kinetic equilibrium of hydrogen peroxide concentration in the oxidizing cyclohexanol under the above conditions was 2.7 moles/liter at 120C. An analogous experiment was made with an initial addition of cyclohexanone. Results show that about 20% of the added cyclohexanone is oxidized by a chain

Card 1/2

L 15480-63

ACCESSION NR: AP3005452 /

reaction and that the rest is oxidized by H_2O_2 . Thus, it was shown that the oxidation products of cyclohexanone accelerate the decomposition of hydrogen peroxide during the oxidation of cyclohexanol. It was established that the higher the addition of cyclohexanone at the beginning of the reaction, the higher is the kinetic equilibrium of the cyclohexanone in the oxidized cyclohexanol. Orig. art. has: 6 figures, 1 table and 5 formulas.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of chemical physics, AN SSSR).

SUBMITTED: 21Sep62

DATE ACQ: 06Sep63

ENCL: 00

SUB CODE: CH

NO REF SCV: 007

OTHER: 000

Card

2/2

S/195/63/004/001/003/009
E073/E436

AUTHOR: Denisov, Ye.T.

TITLE: The formation of free radicals in the system $RH + O_2$
1, Tetralin, cyclohexanol, cyclohexanone

PERIODICAL: Kinetika i kataliza, v.4, no.1, 1963, 53-59

TEXT: The work was carried out in view of insufficient knowledge of the mechanism of chain initiation in the system. The author considered that the most likely chain initiation process is a trimolecular reaction



The experimental data were analysed to discover whether they fit into Eq.(IV). The liquid hydrocarbons were oxidized in a quartz reactor through which O_2 was passed at the rate of 0.2 ml/sec. The formation of free radicals was followed by measuring changes in the concentration of α -naphthol (oxidation inhibitor). For tetralin the chain initiation was studied as a function of the concentration of dissolved O_2 (i.e. its partial pressure) at 141°C, the concentration of α -naphthol being 2×10^{-3} mole/litre. Free radicals formed without the participation of O_2 at the rate of

Card 1/3

The formation of free ...

S/195/63/004/001/003/009
E075/E436

6×10^{-9} mole/litre·sec (activation energy = 48 kcal/mole) and also by the reaction of tetralin with O_2 at the rate of 18×10^{-9} mole/litre·sec (activation energy 18.4 ± 2 kcal/mole). The velocity constant for reaction IV at $130^\circ C$ was 2.18×10^{-8} l²/mole² sec. The absolute velocity constant was $K = 3.5 \times 10^3 \exp(-20700/RT)$ l²/mole² sec. The activation energy for reaction IV was 20.7 ± 2 kcal/mole. This experimental value is in good agreement with the calculated one. For cyclohexanol the rate of free radical formation at $111^\circ C$ increased linearly with the partial pressure of O_2 from 2×10^{-9} at $p_{O_2} = 630$ mm Hg. The chains were initiated via the reaction of cyclohexanol with O_2 and also directly from cyclohexanol without O_2 . The free radicals were formed by reaction IV with the activation energy of 16 ± 2 kcal/mole. The absolute velocity constant for reaction IV was $k = 8.3 \cdot \exp(-16000/RT)$. For cyclohexanone the inhibitor was consumed at the rate of 2.8×10^{-8} mole/litre sec at $120^\circ C$ and 4×10^{-8} mole/litre sec at $130^\circ C$. In this case the formation of free radicals also proceeded according to reaction IV with the activation of 17.5 ± 4 kcal/mole and the absolute velocity constant

Card 2/3

The formation of free

S/195/63/004/001/003/009
E075/E436

of $220 \exp(-17500/RT)$ $^2/\text{mole}^2 \text{ sec}$. There are 6 figures and 3 tables.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR
(Institute of Chemical Physics AS USSR)

SUBMITTED: November 28, 1961

Card 3/3

DENISOV, Ye.T.

Kinetics of consumption of an inhibitor introduced at the start
of oxidation reaction. Kin. i kat. 4 no.4:508-516 JI-Ag '63.
(MIRA 16:11)

1. Institut khimicheskoy fiziki AN SSSR.

L 18304-63

EWP(j)/EPF(c)/EWT(m)/BDS Pc-4/Pr-4 RM/WW/JW/JFW

ACCESSION NR: AP3004989

S/0076/63/037/008/1896/1899

AUTHOR: Denisov, Ye. T.

TITLE: Formation of free radicals by the reaction of hydroperoxides with ketones

SOURCE: Zhurnal fiz. khimii, v. 37, no. 8, 1963, 1896-1899

TOPIC TAGS: free radical formation, tertiary butyl hydroperoxide-cyclohexanone, cumyl hydroperoxide-cyclohexanone, cumyl hydroperoxide-methyl ethyl ketone, free radical

ABSTRACT: Free radical formation was investigated in tertiary butyl hydroperoxide-cyclohexanone, cumyl hydroperoxide-cyclohexanone, and cumyl hydroperoxide-methyl ethyl ketone systems by the method of inhibiting consumption of Alpha-naphthylamine. Hydroperoxide adds reversibly to ketones with the formation of peroxides which rapidly decompose to free radicals. With cyclohexanone, the greater its concentration, the greater the amount of peroxide and the faster the free radical formation. Two active forms of peroxide are formed with methylethyl ketone. Acetic acid accelerates the reversible addition of hydroperoxide to ketone. Rates were calculated for the reactions studied. Orig. art. has: 4 figures, 1 table, 4 equations and 2 formulas.

Card 1/2

L 22652-65 EWT(m)/EPF(c)/IMP(j) Pc-4/Pr-4 RM/MLL

ACCESSION NR: AT5002131

S/0000/64/000/000/0201/0204

AUTHOR: Denisov, Ye. T.; Kharitonov, V. V.

TITLE: The mechanism of oxidation of cyclohexanol to cyclohexanone

SOURCE: AN SSSR. Institut neftekhimicheskogo sinteza. Sintez i svoystva monomerov (The synthesis and properties of monomers). Moscow, Izd-vo Nauka, 1964, 201-204

TOPIC TAGS: cyclohexanol oxidation, cyclohexanone synthesis, hydrogen peroxide production

ABSTRACT: The kinetics of oxidation of cyclohexanol in O₂ have been studied to establish conditions for the maximum concentration and yield of cyclohexanone and hydrogen peroxide. Cyclohexanol was oxidized in a laboratory reactor at 110-130 C with oxygen or in an inert atmosphere with hydrogen peroxide. The chain reaction was shown to involve 100-1000 steps with hydrogen peroxide participating in chain branching. Hydrogen peroxide is consumed during the oxidation of cyclohexanol and by heterogeneous decomposition. Cyclohexanol is oxidized by hydrogen peroxide and by free peroxide radicals, and its kinetic equilibrium concentration increases if a ketone is added to the cyclohexanol feed. The kinetic equilibrium concentration of hydrogen peroxide goes through a maximum

Card 1/2

L 22652-65

ACCESSION NR: AT5002131

in the initial reaction period and decreases rapidly as the concentration of ketone oxidation products increases. The latter accelerate the decomposition of hydrogen peroxide. To obtain maximum yields of cyclohexanone, hydrogen peroxide should be removed or decomposed; to obtain maximum yields of hydrogen peroxide, the oxidation products of cyclohexanone, and particularly the very active formic acid, should be removed from the system. Orig. art. has: 1 formula.

ASSOCIATION: None

SUBMITTED: 30Jul64

ENCL: 00

SUB CODE: OC, 6C

NO REF SOV: 001

OTHER: 000

Card 2/2

DENISOV, Ye.P.; SHCHERBININ, V.P.

Synergetic effect of alcohols on the inhibitive power of aromatic amines. Izv. AN.SSSR.Ser.khim. no. 5:919-921 My '64. (KIRA 17:6)

1. Institut khimicheskoy fiziki AN SSSR.

L 21134-65 BFF(c)/EMP(j)/ENT(m) Pc-4/Pr-4 RPL RM/WM/JFM
 ACCESSION NR: AP4045795 S/0062/64/000/009/1583/1500

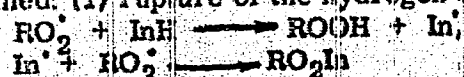
AUTHOR: Denisov, Ye. T.; Aleksandrov, A. L.; Shcheredin, V. P. B

TITLE: Effect of hydrogen bonds on the activity of oxidation inhibitors 1

SOURCE: AN SSSR. Izv. Seriya khimicheskaya, no. 9, 1964, 1583-1590

TOPIC TAGS: hydrogen bond, hydrogen bond formation, oxidation inhibitor, peroxide radical, peroxide radical inhibitor reaction, hydrogen atom rupture

ABSTRACT: The inhibiting action of oxygen-containing compounds on the reactivity between oxidation inhibitors and peroxide radicals was studied. The existence of two types of reactions between peroxide radicals RO_2^{\cdot} and inhibitors (InH) as suggested by Ye. T. Denisov and V. V. Kharitanov (Zh. fiz. khimii 38, 639 (1964)) was confirmed: (1) rupture of the hydrogen atom from the inhibitor:

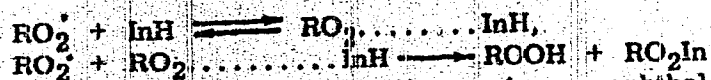


and (2) reversible addition of the peroxide radical to the inhibitor molecule:

Card 1/3

L 21134-65

ACCESSION NR: AP4045795



The relative constants characterizing both reactions using α -naphthol and α -naphthylamine as inhibitors in media containing alcohols, ketones and hydroperoxides were calculated. The inhibiting action of cyclohexanol and cyclohexanone on the reaction of RO_2^\bullet with α -naphthol and of n-butanol, cyclohexanone, and cumyl hydroperoxide on the reaction of RO_2^\bullet with α -naphthylamine was quantitatively characterized. The hydrogen bond of the type $\text{ArO-H} \cdots \text{O} \cdots \text{C} \cdots \text{H}$ formed between the inhibitor molecule and the alcohol (butanol) hinders rupture of the hydrogen from the inhibitor molecule and thus lowers its reactivity. Similar reduction in reactivity of α -naphthylamine by butanol was noted. The lowered inhibitor activity caused by hydroperoxides was explained due to the formation of an amine-hydroperoxide complex rather than the hydrogen bonding only. The effect of the dielectric constant of the medium was examined: increasing alcohol content from 0-10% raised ξ only 10% while the inhibitor activity was lowered three times. Thus the lowered reactivity of oxidation inhibitors with RO_2^\bullet was attributed largely to the hydrogen bond formation between the oxygen-containing compounds and the inhibi-

Cond 2/3

L 21134-65
ACCESSION NR: AP4045795

toris. "The relationship between ρ and n-butanol concentration in mixtures with heptane was plotted at our request by V. D. Komissarov. " Orig. art. has: 8 figures, 3 tables and 7 sets of equations.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics Academy of Sciences SSSR)

SUBMITTED: 02Jul63

ENCL: 00

SUB CODE: GC

NO REF SOV: 008

OTHER: 001

Card 3/3

L 25324-65 EWG(j)/EWT(m)/EPF(c)/EPR/EWP(j)/EWP(t)/EWP(b) Pc-4/Pr-4/PS-4
IJP(c)/RPL JJB/WH/JFW/RM

ACCESSION NR: JP5002727

S/0195/64/005/006/0981/0988

AUTHORS: Danilov, Ye. T.; Kharitonov, V. V.; Raspopova, Ye. N.

TITLE: Formation of free radicals by interaction of hydrogen peroxide with cyclohexanone

SOURCE: Kinetika i kataliz, v. 1, no. 6, 1964, 981-988

TOPIC TAGS: hydrogen peroxide, free radical, oxidation reduction reaction, initiator concentration, equilibrium constant

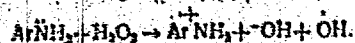
ABSTRACT: The role of cyclohexanone was studied in the formation of free radicals by cyclohexanol oxidation. It is shown that cyclohexanone unites with hydrogen peroxide in an oxidizing reaction to form a peroxide which is quickly reduced into free radicals. This is accomplished by means of α -naphthylamine inhibitors. First, the rate of free radical formation from the tertiary-butyl peroxide as an initiator was determined at various temperatures, and subsequently it was shown that the rate of amine consumption v_a , and consequentially $\beta = M_1/v_a$, varies as the cyclohexanol-cyclohexanone (c-o) mixture changes. The interaction of the amine with hydrogen peroxide was studied next, in both oxygen and in argon atmospheres.

Card 1/3

L 25324-55

ACCESSION NR: AP5002727

The amine oxidation was determined by the reaction



The rate of amine consumption 5×10^{-4} mol/liter was determined from the rate equations

$$v_a = \frac{W_1}{\beta} + k[H_2O_2](\ln H)$$

$$W_1 = \beta(v_a - k[H_2O_2](\ln H))$$

The results show that as the cyclohexanone content is increased k_1 increases and reaches a constant value. In addition, v_a was measured in a c-c mixture in the presence of 0.1 M H_2O_2 in argon. It was found that hydrogen peroxide combines with cyclohexanone 1 mol/1 mol in a reversible reaction with equilibrium constant $K=2.2 \times 10^{-5} \exp(6700/RT)$ liter/mol. The reduction rate constant of this peroxide (to a free radical) is given by

$$k_2 = 2.2 \cdot 10^4 \exp(-10200/RT) \text{ sec}^{-1}$$

Orig. art. has: 7 tables, 9 equations, and 2 figures.

Card 2/3

L 25324-65

ACCESSION NR: AP5002727

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics,
AN SSSR)

SUBMITTED: 15Dec62

ENCL: 00

SUB CODE: GC

NO REF SOV: 003

OTHER: 001

Card 3/3

ACCESSION NR: AP4011434

S/0076/64/038/001/0003/0015

AUTHOR: Denisov, Ye. T.

TITLE: Elementary reactions of forming free radicals in liquid phase oxidation

SOURCE: Zhurnal fiz. khim, v. 38, no. 1, 1964, 3-15

TOPIC TAGS: free radical, free radical formation, liquid phase oxidation, free radical mechanism, monomolecular reaction, bimolecular reaction, trimolecular reaction, chain formation, carbon-carbon bond rupture, oxygen-oxygen bond rupture, kinetics, activation energy, bond strength, reaction rate, carbon-hydrogen bond rupture

ABSTRACT: This article relates to analysis of free radical formation during liquid phase oxidation, study of mechanisms proposed for various types of free radical reactions and evaluation of the kinetics, reaction rate constants, bond strengths, activation energies, including extensive data from the literature. The types of reactions discussed include: monomolecular reactions including rupture

Card 1/2

ACCESSION NR: AP4011434

of the C-C bond, or of the O-O bond in the case of hydroperoxide decompositions, or reaction of hydroperoxide with ketones; bimolecular reactions such as reactions of hydroperoxides with hydrocarbons, decomposition of hydroperoxides by rupture of the O-O and the ROO-H bond with formation of H-OH, and chain forming reactions; trimolecular reactions of chain formation (generation of two alkyl radicals) as in liquid phase chlorination or reaction with hydrogen peroxide. Orig. art. has: 4 figures, 4 tables and 20 equations.

ASSOCIATION: Akademiya nauk SSSR, Institut khimicheskoy fiziki
(Academy of Sciences SSSR, Institute of Chemical Physics)

SUBMITTED: 02Apr63

DATE ACQ: 14Feb64

ENCL: 00

SUB CODE: CH, PH

NO REF SOV: 019

OTHER: 017

Card 2/2

ACCESSION NR: AP4019528

S/0076/64/038/002/0491/0494

AUTHOR: Denisov, Ye. T.; Aleksandrov, A. L.

TITLE: Determination of relative reaction rates of peroxide radicals with inhibitors

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 2, 1964, 491-494

TOPIC TAGS: inhibitor peroxide reaction, alpha naphthol, betha naphthol, alpha naphthylamine, beta naphthylamine, cyclohexane, cyclohexanone

ABSTRACT: Having reviewed different methods for determining the mechanism of inhibitor action in oxidation reactions, the authors propose two new methods of determining the relative constants of reaction rates of peroxide radicals with inhibitors. Complex mathematical formulas are derived, curves are plotted, tables set up and conclusions made as follows. The proposed methods are based on the consumption rate of the inhibitor introduced in a very low concentration. According to these methods, the relative constants of reaction rates of peroxide radicals with α and β -naphthol and α and β -naphthylamine inhibitors for oxidation of cyclohexane and cyclohexanone have been determined. Orig. art.

Card 1/2

ACCESSION NR: AP4019528

has: 3 figures, 14 formulas, 2 tables.

ASSOCIATION: Institut khimicheskoy fiziki AN SSSR (Institute of Chemical Physics, AN SSSR)

SUBMITTED: 28Mar63

DATE ACQ: 31Mar64

ENCL: 00

SUB CODE: GC

NO KEY SOV: 003

OTHER: 002

Card 2/2

L 12606-65 CWT(m)/EPF(c)/EWP(j) Pc-4/Pr-4 RPL WW/JFW/EM
ACCESSION NR: AP4033401 11/0076/64/038/003/0639/0644

AUTHOR: Denisov, Ye. T.; (Moscow); Kharitonov, V. V. (Moscow)

TITLE: The mechanism of inhibition of cyclohexanol oxidation by naphthol. B

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 3, 1964, 639-644

TOPIC TAGS: inhibition, peroxide radical, reaction mechanism, naphthol
inhibitor, cyclohexanol, tert butyl peroxide

ABSTRACT: The mechanism of α -naphthol inhibition of oxidation reaction of cyclohexanol was studied by the kinetic method in the course of the investigation of the reaction mechanism of peroxide radicals with the α -naphthol inhibitor. The reaction was carried out at 120 C and 140 C using tertiary butyl peroxide as an initiator and the constant source of radicals. The inhibition of the oxidation reaction was characterized by the α parameter, which was determined experimentally. The inhibitor exhaustion kinetics and peroxide formation are known. It was found that the α parameter is not constant, but is a function of the concentration of the inhibitor. When the concentration of the inhibitor decreases the peroxide radical concentration and the α parameter increase. It is established for the

Card 1/2

L 126006-65

ACCESSION NR: AP4033401

first time that α -naphthol inhibits the oxidation of cyclohexanol by two mechanisms: linear inhibition and quadratic inhibition mechanism. It was concluded that both mechanisms occurred in the cyclohexanol oxidation as evidenced by the formation of hydrogen bonding $\text{ArOH} \cdots \text{O}^{\text{H}}_{\text{H}}$ which lowered the reactivity of α -naphthol. Orig. art. has: 1 table and 6 figures.

ASSOCIATION: Institut Khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences, SSSR)

SUBMITTED: 0 Mar 63

ENCL: 00

SUB CODE: 00

NO REF SOV: 005

OTHER: 001

Cord 2/2

L 16530-65 EWJ(m)/EPF(c)/ERP(j) Pc-4/Pr-4 RPL/AELC(a) RWH/WH/JW/JFW/RM
ACCESSION NR: AP4044451 S/0076/64/038/008/2085/2087

AUTHOR: Denisov, Ye. T.

TITLE: The role of hydrogen bonds in the formation of free radicals from hydroperoxide

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 8, 1964, 2085-2087

TOPIC TAGS: free radical, hydroperoxide, tert-butyl hydroperoxide, naphthylamine, propylbenzene, hydrogen bond, chemical kinetics ?

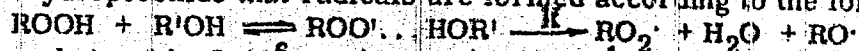
ABSTRACT: The rate of formation of radicals from hydroperoxide was determined in a wide concentration range of hydroperoxide and the proof of the bimolecular decomposition of hydroperoxide via the formation of hydrogen bonds was also obtained. The investigation was carried out with tertiary butyl hydroperoxide, using n-heptane as a solvent. The rate of formation of radicals was measured from the amount of consumed α -naphthylamine. Experiments were conducted in a glass reactor equipped with thermostat in an oxygen atmosphere. The rate constant of the decomposition of hydroperoxide complex into radicals for tert-butyl hydroper-

Cord 1/2

L 16630-65

ACCESSION NR: AP4044451

oxide is $k = 5.7 \cdot 10^7 \exp(-23000/RT) \text{ sec}^{-1}$ and for isopropylbenzene hydroperoxide at 95C it is $k = 5.8 \cdot 10^8 \text{ sec}^{-1}$. It was shown using n-butanol and tertiary butyl hydroperoxide that radicals are formed according to the following reaction:



In pure butanol $k = 5 \cdot 10^6 \exp(-20000/RT) \text{ sec}^{-1}$. It was found that k is a function of the dielectric constant of the medium. Orig. art. has: 3 figures.

ASSOCIATION: Institut fizicheskoy khimii Akademii nauk SSSR (Institute of Physical Chemistry, Academy of Sciences SSSR)

SUBMITTED: 05Sep63

ENCL: 00

SUB CODE: GC

NO REF SOV: 005

OTHER: 003

Cord 3/2

23899-65 EWT(m)/EPT(c)/EWP(j) Pc-4/Pz-4 RPL WW/JFN/RH

ACCESSION NR: AP5002574

S/0076/64/038/012/2875/2881

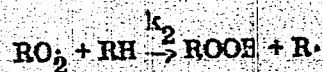
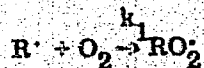
AUTHOR: Denisov, Ye. T.; Kosarev, V. P.

TITLE: Calculation of preexponential factors for some fundamental oxidation reactions

SOURCE: Zhurnal fizicheskoy khimii, v. 38, no. 12, 1964, 2875-2881

TOPIC TAGS: oxidation, methane oxidation, cyclohexane oxidation, rate constant, pre-exponential factor, transition state theory

ABSTRACT: Preexponential factors, which may be used to approximate rate constants, have been calculated for the radical reactions involved in the oxidation of methane and cyclohexane, i.e. the reactions



Cord 1/2

L 23899-65

ACCESSION NR: AP5002574

R being hydrogen, methyl, or cyclohexyl. The calculation was based on the transition state theory, the theory of absolute reaction rates, and the assumption of activated complexes. Calculated results were found to be in good agreement with published experimental data, even though theoretical gas phase factors were compared with experimental data for the liquid phase. Orig. art. has: 3 tables and 14 formulas.

ASSOCIATION: Institut khimicheskoy fiziki, Akademiya nauk SSSR (Chemical physics institute, Academy of sciences, SSSR)

SUBMITTED: 26 Nov 63

ENCL: 00

SUB CODE: OC

NO REF SOV: 004

OTHER: 006

Cord

2/2

L 16442-65 EWT(m)/EPT(c)/EPR/EMP(j) Pc-h/Pr-h/Ps-h/P1-h RFL/AEDC(a)/SSD/SSD(a)/
 AFWL/AS(mp)-2/ WH/JW/FW/RM
 ACCESSION NR: AP4043546 S/0020/64/157/004/0907/0909

AUTHORS: Denisov, Ye.T.; Denisova, L.N.

TITLE: Formation of radicals on reacting hydroperoxides with the double bond in styrene

SOURCE: AN SSSR. Doklady*, v. 157, no. 4, 1964, 907-909

TOPIC TAGS: free radical formation, hydroperoxide styrene reaction, hydroperoxide ethylbenzene reaction, reaction rate, tertiary butyl peroxide, energy of activation, specific heat, bimolecular reaction, hydroperoxide recombination

ABSTRACT: In order to verify the supposition that hydroperoxides will react with olefins to yield free radicals, the formation of free radicals from t-butyl peroxide in the presence of styrene in heptane solutions was examined. The course of free radical formation was followed with α -naphthylamine, as described by Ye. T. Denisov, L.N. Denisova, (DAN, 146, 394 (1962)). It was found that for a given concentration of t-butyl peroxide, the rate of radical formation increased linearly with increasing styrene concentration. This

Cord 1/3

L 16442-65

ACCESSION NR: AP4043546

radical formation proceeds via the bimolecular reaction between hydroperoxide and styrene and by the much slower monomolecular decomposition of the hydroperoxide radicals, according to the rate equation:

$$W = k_1 [ROOH] + k_2 [ROOH][\text{styrene}]$$

At 90°C, $K_1 = 6 \times 10^{-8}$ and $k_2 = 5.9 \times 10^{-7}$ l/mole-sec. By comparing the radical formation rate in the presence of styrene and in the presence of ethylbenzene, it was determined that the increased rate is due to the probable interaction with the double bond in styrene. The energy of activation was calculated to be 17.2 ± 0.5 kcal/mole for a sufficiently large concentration of styrene (72.6 mole/liter). Specific heats were also calculated for several steps in the radical formation mechanism, and it was found that the more energetically favorable reaction is:

$ROOH + C_6H_5CH:CH_2 \rightarrow RO^\bullet + C_6H_5\dot{C}HCH_2OH + 15.2 \text{ kcal/mole}$, as opposed to the reaction proposed by G. Walling and Y. W. Chang (J. Am. Chem. Soc. 76, 1978 (1954)):

$ROOH + C_6H_5CH:CH_2 \rightarrow ROO^\bullet + C_6H_5\dot{C}HCH_3 - 36.9 \text{ kcal/mole}$. Orig. art. has: 3 figures and 4 equations

Card 2/3

L 16442-65

ACCESSION NR: AP4043546

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR
(Institute of Chemical Physics Academy of Sciences SSSR)

SUBMITTED: 06Dec63

ENCL: 00

SUB CODE: GO

NR REF SOV: 003

OTHER: 001

Cord

3/3

DENISOV, Ye.T.; DENISOVA, L.N.

Mechanism of cyclohexanone oxidation. Izv. AN SSSR. Ser. khim.
no.6:1108-1110 Je '64. (MIRA 17:11)

1. Institut khimicheskoy fiziki AN SSSR.

DENISOV, Ye.T.; SOLYANIKOV, V.M.

Mechanism of the liquid-phase oxidation of isopropyl alcohol.
Neftekhimia 4 no.3:453-465 My-Je '64.

(MIRA 18:2)

1. Institut khimicheskoy fiziki AN SSSR.

DENISOV, Ye.T.; ALEKSANDROV, A.L.; SHCHEREDIN, V.P.

Effect of hydrogen bonds on the activity of oxidation inhibitors.
Izv.AN SSSR.Ser.khim. no.9:1583-1590 S '64. (MIRA 17:10)

1. Institut khimicheskoy fiziki AN SSSR.

DENISOV, Ye. I.

Role of hydrogen bonding in the formation of radicals from hydrogen peroxide.
Zhur.fiz.khim, 36 no.8:2085-2087 Ag '64. (MIRA 5811)

L. Institut Khimicheskoy fiziki AN SSSR.

DENISOV, Ye.T.; KHARITONOV, V.V.

Formation of free radicals from hydrogen peroxide in cyclohexanol. *Kin. i kat.* 5 no.5:781-786 S-O '64. (MIRA 17:12)

1. Institut khimicheskoy fiziki AN SSSR.

DENISOV, Ye.T.; KHARITONOV, V.V.; RASPOPOVA, Ye.N.

Formation of free radicals in the reaction of hydrogen peroxide
with cyclohexanone. Kin.i kat. 5 no.6:981-988 N-D '64.

(MIRA 18:3)

1. Institut khimicheskoy fiziki AN SSSR.

L 1654-66 EWT(m)/EPF(c)/EMP(j) RPL RM

ACCESSION NR: AP5021420

UR/0076/65/039/008/1965/1969

541.124/.128

AUTHOR: Privalova, L. G.; Mayzus, Z. K.; Denisov, Ye. T.

TITLE: Effect of the oxidation products of *n*-decane on radical activity in the chain propagation reaction

SOURCE: Zhurnal fizicheskoy khimii, v. 39, no. 8, 1965, 1965-1969

TOPIC TAGS: decane oxidation, free radical, reaction rate, reaction kinetics, chain propagation

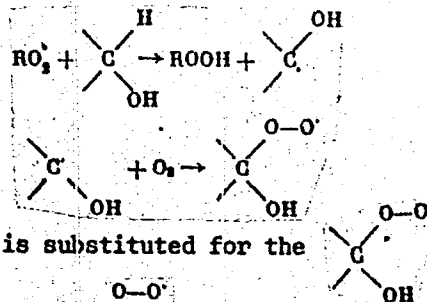
ABSTRACT: The purpose of the study was to determine the role of one of the intermediates (alcohol) in the chain propagation reaction involved in the oxidation of *n*-decane, its influence on the composition and activity of the radicals, and the contribution of the formation of the alcohol to the change in the overall oxidation rate of *n*-decane. To this end, the value of $w/w_i [RH]$ (where w is the rate of the chain process of oxidation of the hydrocarbon and w_i the initiation rate of radicals) was measured in the course of oxidation of *n*-decane in experiments involving the addition of the alcohol (5-nonanol) and compared with the corresponding values

Card 1/3

L 1654-66

ACCESSION NR: AP5021420

obtain during oxidation of *n*-decane without the addition of the products. Addition of the alcohol was found to decrease considerably the activity of the radicals propagating the oxidation chains. The radicals formed by the reaction of $RO_2\cdot$ with the alcohol are 5.2 times less active than the $RO_2\cdot$ radicals. The reaction of $RO_2\cdot$ with the alcohol may be represented as follows:



Thus, the $RO_2\cdot$ radical is substituted for the $\begin{array}{c} \text{O-O} \cdot \\ | \\ \text{C} \cdot \\ | \\ \text{OH} \end{array}$ radical. In the latter, an

intraradical hydrogen bond $\begin{array}{c} \text{O-O} \cdot \\ | \\ \text{C} \cdot \\ | \\ \text{O-H} \end{array}$, may be formed which lowers the activity of this

Card 2/3

L 1654-66

ACCESSION NR: AP5021420

radical. Differences in the nature of the dependence of $w/\sqrt{w_1}[\text{RH}]$ on ROOH obtained from the experimental data and calculated by allowing for the effect of the alcohol indicate that the effect of the oxidation products of *n*-decane is not limited to the inhibiting influence of the alcohol, and that on the contrary, other products present in the reaction mixture have an accelerating effect on the oxidation process. The overall effect of all the oxidation products causes first an increase, then a decrease in the activity of the radicals. Orig. art. has: 3 figures and 9 formulas.

ASSOCIATION: Institut khimicheskoy fiziki, Akademiya nauk SSSR (Institute of Chemical Physics, Academy of Sciences, SSSR)

SUBMITTED: 29Jun64

ENCL: 00

SUB CODE: GC

NO REF SOV: 012

OTHER: 000

Card 3/3

ANTONOVSKIY, V.L.; DENISOV, Ye.T.; KUZNETSOV, I.A.; MEKHRYUSHEV, Yu.Ya.;
SOINTSEVA, L.V.

Mechanism of the liquid-phase oxidation of cumene studied by the
inhibition method. Part 1: Chain initiation. Kin. i kat. 6 no.4:
607-610 JI-Ag '65. (MIRA 18:9)

1. Novokuybyshevskiy filial Nauchno-issledovatel'skogo instituta
sinteticheskikh spirtov i organicheskikh produktov.

DENISOVA, L.N.; DENISOV, Ye.I.

Formation of radicals during the reaction of oxygen with the double bond of styrene. Izv. AN SSSR. Ser. khim. no.9:1702-1704 '65. (MIRA 18:9)

1. Institut khimicheskoy fiziki AN SSSR.

EMANUEL', Nikolay Markovich; DENISOV, Yevgeniy Timofeyevich;
MAYZUS, Zinaida Kuselevna. Prinsipialni uchastie:
ANTONOVSKIY, V.L.; BLYUMBERG, E.A.; VASIL'YEV, R.F.;
GAGARINA, A.B.; GOL'DBERG, V.M.; ZAIKOV, G.Ye.; DORIKOV,
Yu.D.; OBUKHOVA, L.E.; TSEPALOV, V.F.; SHLYAPINTOKH,
V.Ya.; SKIBIDA, I.P., red.

[Oxidation chain reactions of hydrocarbons in the liquid
phase] Tsepnye reaktsii okslenia uglevodorodov v
zhidkoi faze. Moskva, Nauka, 1965. 374 p. (MIRA 18:8)

ANTONOVSKIY, V.L.; DENISOV, Ye.T.; SOLNTSEVA, L.V.

Inhibition method in studying the mechanism of liquid-phase oxidation of cumene. Part 2: Mechanism of degenerate chain branching. *Kin. i kat.*, 6 no. 5: 815-819. S.S.O. '55.

(MIRA 18:11)

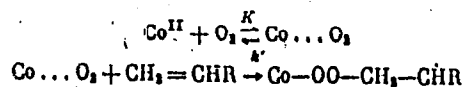
1. Nauchno-issledovatel'skiy institut sinteticheskikh spirtov i organicheskikh produktov, Novokuybyshevskiy filial.

L 38790-66 EWT(m)/ENP(J) RM/JWD	
ACC NR: AP6024022	SOURCE CODE: UR/0062/66/000/006/1095/1097
AUTHOR: Denisova, L. N.; Denisov, Ye. T.; Degtyareva, T. G. 52 3	
ORG: Institute of Chemical Physics, Academy of Sciences SSSR (Institut khimicheskoy fiziki Akademii nauk SSSR)	
TITLE: Free radical formation by the reaction of oxygen with styrene and cobalt	
SOURCE: AN SSSR. Izv. Ser khim, no. 6, 1966, 1095-1097	
TOPIC TAGS: oxidation, catalysis, free radical, reaction mechanism, oxidation kinetics, cobalt	
ABSTRACT: The mechanism of catalysis by metals able to assume several valences, of liquid-phase oxidation reactions has been studied. The formation of free radicals by a reaction between styrene, oxygen, and Co(II) was established. The reaction was carried out with Co(II) as the stearate or the acetylacetonate in organic-solvent solution at 115C in the presence of an inhibitor (α -naphthylamine). The reaction kinetics were studied and a reaction mechanism was proposed. The rate of formation of free radicals was determined from the rate of consumption of the inhibitor, on the assumption that two free radicals consecutively react with one inhibitor molecule. The reaction mechanism	
Card 1/2	UDC: 542.97+547.024+541.124

L 38790-66

ACC NR: AP6024022

proposed involves the reversible formation of a complex¹ between oxygen and Co(II) and the subsequent reaction of this complex with styrene to form the free radicals:



Orig. art. has: 4 figures.

[SM]

SUB CODE: Q4, 21/ SUBM DATE: 22Nov65/ ORIG REF: 002/
OTH REF: 002

Cord. 2/2. *1/2*

ACC NR: AP6034616

SOURCE CODE: UR/0062/66/000/010/1737/1743

AUTHOR: Aleksandrov, A. L.; Denisov, Ya. T.

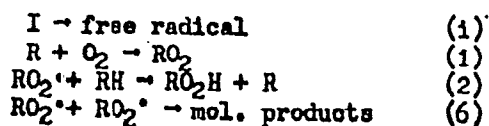
ORG: Institute of Chemical Physics, Academy of Sciences, SSSR (Institut khimicheskoy fiziki Akademii nauk SSSR)

TITLE: Elementary rate constants of radical reactions in cyclohexanol undergoing oxidation

SOURCE: AN SSSR. Izvestiya. Seriya khimicheskaya, no. 10, 1966, 1737-1743

TOPIC TAGS: cyclohexanol, reaction rate, oxidation kinetics, free radical

ABSTRACT: The chain oxidation of an alcohol RH (cyclohexanol was studied) can be represented as follows (I being the initiator)



The aim of the study was to determine the absolute rate constants of reactions (2) and (6). The values obtained for these constants made it possible to analyze these elementary reactions in greater detail. To explain the effect of the medium on the

Card 1/2

ACC NR: AP6034616

oxidation of cyclohexanol, the rate constants of (2) and (6) were measured in mixtures of cyclohexanol and chlorobenzene. The ratio of the constants $k_2/\sqrt{k_6}$ was found by measuring the rate of initiated oxidation and the initiation rate (method of inhibitors), and the method of photochemical aftereffect was used to measure the ratio k_2/k_6 , whence k_2 and k_6 were determined. Orig. art. has: 3 figures and 4 tables.

SUB CODE: 07/ SUBM DATE: 18May64/ ORIG REF: 009/ OTH REF: 009

ACC NR: AP7007076

SOURCE CODE: UR/0048/66/030/010/1577/1580

AUTHOR: Denisov, Ye. V.; Dedenko, L. G.; Dubrovina, S. A.; Kotel'nikov, K. A.;
Mrosov, A. Ye.; Ogurtsov, O. F.; Sokolovskiy, V. V.; Slavatskiy, S. A.;
Fetisov, I. N.

ORG: Physics Institute im. P. P. Lebedev, AN SSSR (Fizicheskii institut
AN SSSR)

TITLE: Nuclear cascade process in an ionization calorimeter [Paper
presented at the All-Union Conference on Cosmic radiation physics, Moscow,
15-20 Nov 1965]

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 10, 1966,
1577-1580

TOPIC TAGS: pi meson, calorimeter, proton

SUB CODE: 20

ABSTRACT: Results of the calculation of the nuclear cascade process in an iron
absorber were correlated with experimental data obtained on the ionization ca-
lorimeter of the Tyan'-Shan' Cosmic Ray Station. It was established that at
 $E_0 = 300$ Bev approximately 30% of the energy spent being carried away by
strongly ionizing particles ("black tracks"), and the rest by protons with an
energy of ~ 150 Mev ("grey tracks"). Errors in the measurement of $E_0 = 200$
Bev associated with fluctuations in the recording of strongly ionizing parti-
cles amounted to $\sim 12\%$ ($\sim 11\%$ for "black tracks" and $\sim 4\%$ for "grey
tracks"). In measurements by means of an ionization calorimeter of the energy
transmitted to π^0 mesons, ionization produced by particles originating from
nuclear splitting must be considered. The authors thank N. A. Dobrotin and V. S.
Murzin for valuable critical observations, V. G. Ignat'yevaya, Z. G. Yereiminaya,

ACC NR: AP7007076

L. V. Shibayeva and N. S. Kochurkinaya for processing the experimental data. Orig. art. has: 2 figures, 2 formulas and 1 table. [JPRS: 39,658]

20451

S/056/61/040/002/004/047
B113/B214

9.9843

AUTHORS: ~~Denisov, Ye. V.~~, Zatsepin, V. I., Nikol'skiy, S. I.,
Pomanskiy, A. A., Subbotin, B. V., Tukish, Ye. I.,
Yakovlev, V. I.

TITLE: Observation of nuclear-active particles and electron-photon
avalanches with energies greater than 10^{12} ev at a height of
3860 m above sea level

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 40,
no. 2, 1961, 419-425

TEXT: The nuclear-active and electron-photon component of high-energy
cosmic radiation were studied to obtain additional data on the nature of
nuclear interaction at energies $\geq 10^{13}$ ev. The observations were made in
1959 on the Pamir. The detector consisted of four rows of ionization
chambers between which were placed lead and carbon, and over which were
10 hodoscope groups containing 12 counters (330 cm^2 each). Besides, two
cylindrical chambers were placed at a distance of 7 m from the middle of
this setup, a hodoscopic point and detector of the energy density of the
Card 1/3

Observation of nuclear-active...

20451
S/056/61/040/002/004/047
B113/B214

electron-photon component were at a distance of 18 m from the center and served to study the fluctuations of the particle flux. If the axis of the extensive atmospheric shower hits the recording area of the detector, the number of particles in the shower may be determined from the formula $N = 1000 q$, where q is the effective particle density of the particle flux per m^2 . Assuming that in every event, nucleons and pions impart $1/3$ of their energy to the new resulting pions, the energy of the nuclear-active particles was found to be given by $E = 2.3 \cdot 10^8 N^{1.04}$ ev which holds for the range $10^{11} \text{ ev} \leq E \leq 5 \cdot 10^{14} \text{ ev}$. In this energy range, the nuclear interaction cross section does not decrease with the increasing energy of the nucleons involved. From a comparison with the experimental data of other papers, the integral energy spectrum of the nuclear-active particles in the range $10^{12} \div 10^{13} \text{ ev}$ can be expressed in the form $f(E) \sim E^{-n}$, where $n = 1.57 \pm 0.1$. For energies of nuclear-active particles $< 10^{13} \text{ ev}$, the energy spectra are determined from the spectral form of the primary particles with the help of the mean free path for nucleon interaction and the value of the inelasticity coefficient. In the intermediate range, the

Card 2/3

20451

S/056/61/040/002/004/047

B113/B214

Observation of nuclear-active...

energy spectrum is not an exponential function, and is determined from the fluctuation in the number of collision events and in the value of the inelasticity coefficient, and also from the accuracy of energy measurement in each individual event of the recording of nuclear-active particles. Professors N. A. Dobrotin and G. T. Zatsepin are thanked for discussions; G. Ya. Goryacheva, G. V. Grishina, G. V. Minayeva, L. A. Miroshnichenko, A. M. Mozhayev, N. M. Nesterova, V. I. Sokolovskiy, and A. Ye. Subbotina are thanked for participation in the work. There are 4 figures and 7 references: 6 Soviet-bloc and 1 non-Soviet-bloc.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR
(Institute of Physics imeni P. N. Lebedev, Academy of
Sciences USSR)

SUBMITTED: July 12, 1960

Card 3/3

DENISOV, Ye. V., NIKOLSKIY, S. I., POMANSKIY, A. A. and DANILOVA, T. V.

"Nuclear-Active Particles in Showers with Different Number of Particles"

Report presented at the International Conference on Cosmic Rays
and Earth Storm, 4-15 September 1961, Kyoto, Japan.

P. N. Lebedev Institute of Physics, Moscow, USSR

ACCESSION NR: AP4037566

S/0056/64/046/005/1561/1577

AUTHOR: Danilova, T. V.; Denisov, Ye. V.; Nikol'skiy, S. I.

TITLE: Determination of the total number of nuclear active particles in extensive air showers with the number of particles between $3 \cdot 10^3$ and 10^7

SOURCE: Zh. eksper. i teor. fiz., v. 46, no. 5, 1964, 1561-1577

TOPIC TAGS: cosmic ray, nuclear particle, nuclear active particle, cosmic shower, cosmic air shower

ABSTRACT: The dependence of the number of nuclear active particles N_n on the total number of shower particles N has been measured for $N = 3 \cdot 10^3 - 10^7$. The experiments were conducted at the Tian-Shan Cosmic Ray Station of the FIAN (Lebedev Physics Institute of the Academy of Sciences USSR) during the winter and spring of 1961. Showers with a given number of particles and an axis which passed near the center of the experimental array were selected by combining coincidences and anticoincidences registered by counters covering a given

Card 1/3

ACCESSION NR: AP4037566

area. The nuclear active particles were recorded by five neutron detectors which differed in effective area, thickness of lead absorber, and distance from center of the array. According to data obtained, the integral number spectrum (at 3330 meters above sea level) can be expressed by the following formulas:

$$S(>N) = (1.1 \pm 0.1) \cdot 10^{-4} \left(\frac{N}{3.5 \cdot 10^4} \right)^{-1.22} \text{ hr}^{-1} \cdot \text{m}^{-2} \text{ for } N < 3.5 \cdot 10^4,$$

$$S(>N) = (1.1 \pm 0.1) \cdot 10^{-4} \left(\frac{N}{3.5 \cdot 10^4} \right)^{-1.5} \text{ hr}^{-1} \cdot \text{m}^{-2} \text{ for } N > 3.5 \cdot 10^4.$$

It is possible that, because of the effect of the change in the lateral distribution function of shower particles near the shower axis, the shower spectrum is reduced when N is small; however, the amount by which it is reduced does not exceed 0.1. The dependence of N_n on N can be represented by an exponential law with an exponent

Cord 2/3

ACCESSION NR: AP4037566

of 0.72 ± 0.06 . The absolute flux of nuclear active particles is in satisfactory agreement with the results of Cocconi and Marsden obtained for the same threshold value, and leads to a reasonable result for the spectrum of nuclear active particles in showers with energies between $2 \cdot 10^8$ and $3 \cdot 10^9$ ev in comparison to the results of high energy measurements by Nikolsky and Legan. An estimate shows that the energy contribution of nuclear active particles is different for large and small showers. The results of various experiments on the dependence N_n on N show that a better approximation for the whole range $3 \cdot 10^3 < N < 2 \cdot 10^6$ than that given by $N_n^2 \sim N^\beta$ (where β is a constant) is obtained by the following set of formulas: $N_n \sim N^{0.79}$ for $N < 5 \cdot 10^4$, $N_n \sim N^{0.4}$ for $5 \cdot 10^4 < N < 2 \cdot 10^5$, and $N_n \sim N^{0.96}$ for $2 \cdot 10^5 < N < 2 \cdot 10^6$. Orig. art. has: 14 formulas, 8 figures, and 3 tables.

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Sciences SSSR)

SUBMITTED: 18Nov63

DATE ACQ: 09Jun64

ENCL: 00

SUB CODE: AA

NO REF SOV: 006

OTHER: 015

Card 3/3

L 2534-66 EWT(m)/EWP(j)/EWA(h)/EWA(l) RM

ACCESSION NR: AP5021335

UR/0120/65/000/004/0077/0082

539.1.074.3

AUTHORS: Yudin, Ye. P.; Dovzhenko, O. I.; Denisov, Ye. V.

TITLE: Study of a large plastic scintillator

SOURCE: Priory i tekhnika eksperimenta, no. 4, 1965, 77-82

TOPIC TAGS: scintillator, plastic, photomultiplier, polystyrene, meson

ABSTRACT: The scintillation properties of a block of polystyrene (100 x 100 x 30 cm) doped with about 1% paraterphenyl and about 0.05% POPOP were examined. Light flashes were recorded by a FEU-2B photomultiplier, and all measurements were made at 1050 v. This is a logarithmic multiplier with a wide range of pulse heights. A pyramidal light guide was placed between the scintillator and the photomultiplier. Guides with three different apical angles were used: 36, 78, and 106°. Geiger counters were placed to cover part of the face of the scintillator. In all, 32 counters were used in a very elaborate setup, detailed diagrams of which are given in the article. For the light guide with apical angle of 106°, the most probable pulse height proved to be 2.8 mv; for 78° it was

Card 1/2

L 2534-66

ACCESSION NR: AP5021335

12

2.5 mv, and for 36° , 0.6 mv. The ratio of most probable pulse heights of particles passing through the center and through the extreme corners of the scintillator proved to be 18. The described detector may be used for determining density of particle streams in broad atmospheric showers at different positions of the shower axis. It was found that the pulse amplitudes taken from the photomultiplier during passage of a shower of 10 particles through the scintillator were 28, 26, and 6.2 mv for the three apical angles 106° , 78° , and 36° , respectively. The standard deviations for these were 18.5, 16.5, and 14.5%, respectively. "In conclusion, the authors express their sincere thanks to S. I. Nikol'skiy for his valuable suggestions during discussion of the experimental data, N. S. Rastorguyeva for her aid in working up the results, and L. Ye. Andreyev for his aid in setting up the apparatus." Orig. art. has: 6 figures. 44.55 [04]

ASSOCIATION: Fizicheskiy institut AN SSSR, Moscow (Physics Institute, AN SSSR)

SUBMITTED: 24Jun64

ENCL: 00

SUB CODE: OP, EM

NO REF SOV: 001

OTHER: 001

ATD PRESS: 4/10

beli
Card 2/2

DENISOV, YU.

KORCHAGIN, V.; CHUDAKOV, V.; ROVNYKH, A.; PLATONOV, V.; DENISOV, Yu.;
LYUBAKOV, V.; LEVAISHOV, L.; GROYSMAN, E.; YUMATOV, V.; MOSIN, V.

Designing, constructing, flying. Tekn. mol. 26 no.3:31 '58.

(MIRA 11:3)

1. Predsedatel' soveta Osobogo konstruktorskogo byuro (for
Korchagin). 2. Chleny soveta Osobogo konstruktorskogo byuro (for
all except Korchagin).

(Airplanes--Design and construction)

Denisov, Yu. A.

MIKHAYLOV, G.P.; MASLOV, Yu.A.; POPONOV, A.A.; GALAKTIONOV, A.T.;
BOBKOV, Ye.I.; NIKONOV, I.P.; DENISOV, Yu.A.; SHAPKOV, B.K.;
SHATOV, R.Yu.; MIKHAYLOV, S.I.; PETUNIN, I.V.; KHOVANETS, V.K.;
KOCHEVA, G.N.; LABUTINA, E.A.

In memory of A. I. Akhun; an obituary. Svar.proizv. no.12:46 D '57.
(MIRA 11:1)

1. Sotrudniki Kafedry "Oborudovaniye i tekhnologiya sverchnogo
proizvodstva" Ural'skogo politekhnicheskogo instituta imeni
S.D. Kirova.

(Akhun, Alekdandr Il'ich, d. 1957)

MASLOV, Yuvnaliy Aleksandrovich; MIKHAYLOV, S.I., kand.tekhn.nauk,
retsenzent; FILONOV, L.K., inzh., retsenzent; DENISOV, Yu.A.,
inzh., red.; DUGINA, N.A., tekhn.red.

[Welding] Svarochnoe proizvodstvo. Moskva, Gos.nauchno-tekhn.
izd-vo lit-ry, 1959. 328 p. (MIRA 12:11)
(Welding)

UKOLOVA, Yelena Nikolayevna; MIKHAYLOV, S.I., kand.tekhn.nauk, retsenzent;
DENISOV, Yu.A., inzh., red.; DUGINA, N.A., tekhn.red.

[Automatic welding] Avtomaticheskaya svarka. Moskva, Gos.nauchno-
tekhn.izd-vo mashinostroit.lit-ry, 1960. 147 p. (MIRA 13:10)
(Electric welding) (Automatic control)

S/124/60/000/009/005/005
A005/A001

Translation from: Referativnyy zhurnal, Mekhanika, 1960, No. 9, p. 157, # 12400

AUTHORS: Denisov, Yu.A., Shatov, M.Ya.

TITLE: Mechanical Examinations of Welded Joints *yo*

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1959, sb. 80, pp. 179-182

TEXT: The authors point out that it is not allowable to judge on the supporting power of a welded joint from the tensile strength of its weakest zone, because the development of elastic and plastic deformations will be different for different correlations of the mechanical characteristics of the metal in the individual zones of the welded joint. Since the conditions of plastic deformation development show considerable effect upon the supporting power of the welded joint as a whole, the authors propose to revise the specimen shape and the test methods of welded joints for determining the yield point and the specific elongation, which can not be obtained by tensile tests of welded joints according to the valid ГОСТ 6996-54 (GOST 6996-54). The proposal presented is corroborated by the exam. *V*

Card 1/2

Mechanical Examinations of Welded Joints

S/124/60/000/009/005/005
A005/A001

ination results of a welded joint as well as the welding metal and the base metal, which show that the strength characteristics of the welded joint are higher than those of the base metal, but lower than those of the welding metal.

N.O. Okerblom

Translator's note: This is the full translation of the original Russian abstract.

Card 2/2

KOBZEV, Isay Fedorovich; MASLOV, Yu.A., inzh., retsenzent; YES'KOV,
K.A., dotsent, red.; DENISOV, Yu.A., inzh., red.; MARCHENKOV,
I.A., tekhn.red.

[Gas-arc welding] Gazelektricheskaya svarka. Pod red. K.A.
Es'kova. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry,
1960. 47 p. (Nauchno-populiarnaya biblioteka rabochego-svarshchika,
no.15). (MIRA 14:2)
(Electric welding) (Protective atmospheres)

23

Replacement of black liquor by mirabilite in sulfate pulping. Yu. A. Deglav. *Bumazhnyy Prom.* 18, No. 4, 46-9 (1940). Satisfactory results are tentatively reported in sulfate pulping with the substitution of Glauber salt for black liquor. The method showed no destructive effect on cellulose and gave pulp with normal ash content and whiteness. In the regeneration of spent soda in the Wagner furnace, the process proceeds normally giving a greater content of sulfides. The work is being continued. Chas. Blaise.

ASAC-SLA METALLURGICAL LITERATURE CLASSIFICATION

SECTION: STEELMAKING

SECTION: METALLOGICAL LITERATURE CLASSIFICATION

SECTION: METALLOGICAL LITERATURE CLASSIFICATION

CA

Reduction of sulfates in furnaces for alkali recovery.
 Yu. A. Delyagin, *Khimich. Prom.* 26, No. 1, 10-21
 (1980). Optimum reduction results in Wagner furnaces
 when the ratio $C:Na_2SO_4$ in the black liquor is 3.5.

4.0. The percentage reduction at this point is from 74 to 77. At a ratio of 2.5, only 65-75% reduction is obtained. The ratio of Na_2SO_4 (calcd. as Na_2O) to the total Na_2O content of the liquor for optimum reduction should be about 0.2 based on freshly introduced sulfate and about 0.20 based on total Na_2SO_4 (fresh plus black liquor). The degree of reduction of sulfates varies inversely with the amt. of excess air. Optimum reduction results when the vacuum in the first gas outlet from the boiler is not more than 1-3 mm. H_2O , when the coeff. of excess air at the outlet from the furnace is not more than 1.05 and the C content of the ash is not less than 32%. The degree of reduction is little influenced by the compn. of the liquor or the wetness of the sulfate. Marshall Sittig

CA

The basis of commercial methods for the causticization of sulfate liquors. Yu. A. Denisov (Nauch. Tsellulosa. Zavoda). *Dokl. Akad. Nauk SSSR*, No. 3, 6-11(1949).-- Alternate methods of calcn. of degree of causticization are discussed. The results of lab. and plant expts. indicate that increased HO concn. in the green liquor gives a lesser degree of causticization and that a concn. in excess of 20 g./l. is undesirable. Green liquor of the usual mildity (30-32%) with an initial HO concn. of 12.5 to 20.5 g./l. can be causticized up to 85% with 10% excess lime and up to 88% with 20% excess lime. Marshall Sittig

1. DENISOV, YU. A.
2. USSR (600)
3. Wood Pulp Industry
4. Experiments to accelerate production of sulfate pulp.
Bum. prom. 27 No. 6 - 1952.

9. Monthly List of Russian Accession, Library of Congress, February, 1953. Unclassified.

GALAKTIONOV, A.T.; ~~DENISOV, Yu.A.~~; KOPYTOV, G.T.; MASLOV, Yu.A.; NIKONOV, I.P.; PETUNIN, I.V.; KOCHVA, G.N.; KUZNETSOV, A.P.; LELEKO, N.M.; RAZIKOV, M.I.; SPESHKOV, V.V.; STEPANOV, B.V., STEPANOV, V.V.; kand. tekhn. nauk; SHELOMOV, B.Ye.; YUNYSHEV, G.P.; YES'KOV, K.A., dots., retsenzent; BAKSHI, O.A., dots., retsenzent; BEREZKIN, P.N., dots., retsenzent; PATSKEVICH, I.R., dots., retsenzent; RUDAKOV, A.S., dots., retsenzent; FIZHBEYN, N.E., inzh., retsenzent; KHRUSTALEV, L.Ya., inzh., retsenzent; KRUTIKHOVSKIY, V.G., inzh., red. BOBROV, Ye.I., kand. tekhn. nauk, red. DUGINA, N.A., tekhn. red.

[Welding handbook] Spravochnik rabochego-svarshchika. Pod red. V.V.Stepanova. Moskva, gos. nauchno-tekhnizd-vo mashinostroit. lit-ry, 1960. 640 p. (MIRA 14:6)

(Welding)

KHRUSTALEV, Leonid Yakovlevich; RAZIKOV, M.I., kand. tekhn. nauk,
retsenzent; DENISOV, Yu.A., inzh., red.; DUGINA, N.A., tekhn.
red.

[Automatic arc welding and hard facing] Avtomaticheskaya dugo-
vaia svarka i naplavka. Moskva, Mashgiz, 1961. 43 p. (Nauchno-
populiarnaya biblioteka rabochego-svarshchika, no. 11)

(MIRA 15:3)

(Electric welding)

(Hard facing)

BARANOV, Nikolay Aleksandrovich; GORBOVSKIY, Boris Grigor'yevich; SOLYUS, N.G., retsenzentskiy [deceased]; DENISOV, Yu.A., retsenzentskiy; GRABOVSKIY, V.A., red.; PROTANSKAYA, I.V., red. izd-va; VOLOKHONSKAYA, L.V., red. izd-va; VDOVINA, V.M., tekhn. red.

[Technology and automation of cellulose production] Tekhnologiya i avtomatizatsiya tselliuloznogo proizvodstva. Moskva, Goslesbumizdat, 1961. 471 p. (MIRA 14:6)
(Cellulose) (Automation)

Strength of welded joints under repeated impact load

27381
S/125/61/000/003/006/016
A161/A133

Ural'skiy politekhnicheskii institut im. M.S. Kirova (Ural Polytechnic Institute imeni S.M. Kirov)

SUBMITTED: April 9, 1960

4

Card 3/3

Strength of welded joints under repeated impact load

27381.
S/125/61/000/003/006/016
A161/A133

were conducted in a ДСВ-150 (DSVO-150) ram of VEB Werkstoffprüfmaschinen Leipzig, with 10 blows per minute. The test results were processed using statistical mathematics. The results are illustrated in 4 graphs and prove that results of conventional impact resistance tests cannot be used to determine the fatigue resistance in service with recurrent impact. Common impact resistance tests give clearly higher resistance value in normalized steel than in overheated, but the impact fatigue tests led to a different conclusion - that normalized and overheated steel has nearly an equal fatigue limit, and overheated SKhL-4 steel takes the first place and normalized the last as to impact fatigue strength. The strength of welded joints was nearly equal to the strength of the base metal when the yield limits of weld metal and base metal related as 0.82 ± 1.33 . [Abstracter's note: The composition of the tested steel and of the electrodes is not given.] There are 7 figures and 9 references: 6 Soviet-bloc and 3 non-Soviet-bloc. The 2 references to the English-language publications read as follows: T. Stanton and L. Bairstow, Resistance of materials to impact. Proceeding Institute Mechanics Engineering, November 1908; Mc Adam, Proceeding of American Society, Testing Materials, v. 2, 1922, v. 23, 1923.

ASSOCIATIONS: Ural'skiy filial TsNII MPS (Ural Branch TsNII MPS) (S.I. Mikhaylov);

Card 2/3

S/032/61/027/002/014/026
B134/B206

AUTHORS: Mikhaylov, S. I. and Denisov, Yu. A.

TITLE: Impact fatigue failures

PERIODICAL: Zavodskaya laboratoriya, v. 27, no. 2, 1961, 188-191

TEXT: A classification of fatigue failures was proposed by D. N. Vidman (Refs. 1, 2) which is completed in this paper on the basis of investigation results. The assumption, also shared by A. I. Lamps (Ref. 3) and Ya. B. Fridman et al. (Ref. 4), that impact fatigue failures in the structure are not different from typical fatigue failures, is wrong. In the present case, it was established that, in spite of the qualitative similarity of impact fatigue failures and common fatigue failures, the classification according to D. N. Vidman is not valid for impact fatigue failures of the steel grades investigated. Cylindrical samples (diameter 7 mm) of the steel grades M16C (M16S), 10XCH₃ (1CKhSND), 35, 45, 50C2 (50S2), and Y12 (U12) were subjected to repeated elongation impact tests. The tests were made on an impact ram of the type ACBC-150 (DSVO-150). At the same time, smooth cylindrical samples (diameter 7.52 mm) from the same steel grades were sub-

Card 1/2

Impact fatigue failures

S/032/61/027/002/014/026
B134/B206

jected to ordinary fatigue tests on an MYII-6000 (MUI-6000) machine. The profilograms of the impact fatigue failures were recorded by means of a test needle.(Ref. 4) which was altered for measurements of a roughness of more than 250μ. Special attention was paid to the depth of cracks in dependence on the number of impacts up to failure. Test results showed that in ordinary fatigue tests the depth of fatigue cracks may serve as a criterion for determining the cycles up to destruction, and the overload factor, respectively. This is, however, not valid for impact fatigue failures, since the depth of cracks here depends greatly on the steel grade, and a comparison of the classification according to D. N. Vidman and the profilograms obtained for the investigated steel samples shows a high difference. A classification according to D. N. Vidman is, thus, not applicable to repeated impact loads on materials with different properties. There are 2 figures and 4 Soviet-bloc references.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S. M. Kirova (Ural Polytechnic Institute imeni S. M. Kirov)

Card 2/2

MIKHAYLOV, S.I.; DENISOV, Yu.A.

Strength of welded joints under the effect of repeated shock loading.
Avton. svar. 14 no.3:42-47 Mr '61. (MIRA 14:2)

1. Ural'skiy filial Vsesoyuznogo nauchno-issledovatel'skogo instituta zheleznodorozhnogo transporta Ministerstva putey soobshcheniya (for Mikhaylov). 2. Ural'skiy politekhnicheskii institut im.S.M.Kirova (for Denisov).

(Welding—Testing)

DENISOV, Yu.A., kand.tekhn.nauk; SMIRNOV, I.S., inzh.

Welding innovator's day in Kurgan. Svar. proizv. no.2:46 F '63.
(MIRA 16:2)
(Kurgan—Welding—Technological innovations)

DENISOV, Yu.A., kand, tekhn. nauk

Readers' conference in Kurgan. Svar. proizv. no.3:44 Mr '63.
(Welding Periodicals) (MIRA 16:3)

BAKHRAKH, L.E.; DENISOV, Yu.I.; KIR'YASHKIN, S.I.

Certain special features of ionic focusing of electron beams.
Radiotekh. i elektron 7 no.7:1169-1174 '62. (MIRA 15:6)
(Electron beams) (Electronics)

ITSIKSON, Boris Semenovich; DENISOV, Yuriy Leonidovich;
NOVIKOVA, M.M., ved. red.

[Infrared gas radiators and their use in the national
economy] Gazovye infrakrasnye izluchateli i ikh ispol'zo-
vanie v narodnom khoziaistve. Moskva, Nedra, 1965. 109 p.
(MIRA 18:3)

DENISOV, Yu. M.

DENISOV, Yu. M., Cand Tech Sci -- (diss) "Snowmelting and calculation of maximal discharges of thawed water." Tashkent, 1958. 12 pp (Acad Sci UzSSR. Inst of Water Problems and Hydraulic Engineering. 150 copies (KL, 20-58,97)

DENISOV, Yu.M.

Calculating the maximum rate of snow water flow. Izv. AN Uz.SSR.

Ser. tekhnauk: no.2:81-91 '58.

(MIRA 11:9)

(Stream measurements)

DENISOV, Yu. M.

Determining the assurance of the function of several random values.
Izv. AN Uz.SSR. Ser. tekhn. nauk no. 4:69-71 '58. (MIRA 11:11)

1. Institut vodnykh problem i gidrotekhniki AN UzSSR.
(Functions of several variables)

DENISOV, V.M.; DENISOV, Yu.M.

Theoretical calculation of a hydrograph of the melted snow of
mountain streams. Izv. AN Uz.SSR Ser.tekh.nauk no.5:49-60 '61.
(MIRA 14:11)

1. Sredneaziatskiy nauchno-issledovatel'skiy gidrometeorologicheskiy
institut.

(Hydrography)

DENISOV, Yu.M.

Method for calculating the distribution of the snow cover on mountains from aerial photographs and air temperatures. Izv. AN Uz. SSR. Ser. tekhn. nauk 7 no.6:73-79 '63. (MIRA 17:6)

1. Sredneaziatskiy nauchno-issledovatel'skiy gidrometeorologicheskiy institut.